

CLAIMS

- 1 1. A method for retaining error-control code protection across block-size
2 discontinuities occurring between incoming information, having incoming data
3 formatted into ingress data blocks and ingress headers, one ingress header
4 associated with each ingress data block and conveying information about the
5 each ingress data block, and outgoing information having the incoming data
6 reformatted into egress data blocks with sizes different from the ingress data
7 blocks and egress headers, one egress header associated with each egress data
8 block and conveying information about the each egress data block, the method
9 comprising:
10 (a) generating a code check from data in an ingress data block and from an
11 ingress header associated with the ingress data block;
12 (b) generating a code check from the code check generated in step (a) and
13 an egress header associated with an egress data block derived from in the
14 ingress data block; and
15 (c) generating the outgoing information by combining the egress header with
16 the associated egress data block and code check generated in step (b).
- 1 2. The method of claim 1 wherein step (b) comprises:
2 (b1) generating a code check from the egress header;
3 (b2) subtracting a portion of the code check generated from the associated
4 ingress header in step (a) from the code check generated in step (b1); and
5 (b3) adding the code check generated in step (a) to the code check generated
6 in step (b2).
- 1 3. The method of claim 2 wherein step (b2) comprises adding the inverse of the
2 portion of the code check generated from the ingress header in step (a) to the
3 code check generated in step (b1).

- 1 4. The method of claim 1 wherein step (a) further comprises:
- 2 (a1) modifying the code check generated from data in the ingress data block
3 and the associated ingress header to compensate for non-data bits added
4 to the ingress data block.
- 1 5. The method of claim 4 wherein step (a1) comprises rotating the code check
2 generated from data in the ingress data block and associated ingress header to
3 compensate for non-data bits added to the ingress data block.
- 1 6. The method of claim 1 wherein step (a) further comprises:
2 (a2) modifying the incoming information to compensate for non-data bits added
3 to the ingress data block.
- 1 7. The method of claim 1 wherein step (c) comprises concatenating the egress
2 header with the associated egress data block and the code check generated in
3 step (b).
- 1 8. The method of claim 1 wherein step (a) comprises generating a one's-
2 complement sum of successive n -bit binary words included in the ingress data
3 block and the associated ingress header.
- 1 9. The method of claim 1 wherein step (b) comprises generating a one's-
2 complement sum of successive n -bit binary words included in the egress header.
- 1 10. The method of claim 1 wherein step (a) comprises generating a term-by-term
2 modulo-two sum of successive n -bit binary words included in the ingress data
3 block and the associated ingress header.
- 1 11. The method of claim 1 wherein step (b) comprises generating a term-by-term
2 modulo-two sum of successive n -bit binary words included in the egress header.

- 1 12. The method of claim 1 wherein step (a) comprises generating the residue of the
2 ingress data block and the associated ingress header modulo a generator
3 polynomial.

- 1 13. The method of claim 1 wherein step (b) comprises generating the residue of the
2 egress data block modulo a generator polynomial.

- 1 14. The method of claim 1 wherein the incoming information includes an incoming
2 code check associated with each ingress data block and step (a) further
3 comprises comparing the ingress code check to the incoming code check and
4 generating an error when the ingress code check does not equal the incoming
5 code check.

- 1 15. Apparatus for retaining error-control code protection across block-size
2 discontinuities occurring between incoming information, having incoming data
3 formatted into ingress data blocks and ingress headers, one ingress header
4 associated with each ingress data block and conveying information about the
5 each ingress data block, and outgoing information having the incoming data
6 reformatted into egress data blocks with sizes different from the ingress data
7 blocks and egress headers, one egress header associated with each egress data
8 block and conveying information about the each egress data block, the apparatus
9 comprising:
 - 10 an ingress encoder that generates an ingress code check from data in an
11 ingress data block and from an ingress header associated with the ingress data
12 block;
 - 13 an egress encoder that generates a egress code check from an egress
14 header associated with an egress data block derived from in the ingress data
15 block and from the ingress code check; and

16 a multiplexer that generates the outgoing information by combining the
17 egress header with the associated egress data block and the egress code check.

1 16. The apparatus of claim 15 wherein the egress encoder comprises:
2 an outgoing encoder that generates an egress code check from the
3 egress header and from internal contents;
4 a controller that subtracts a portion of the ingress code check generated
5 from the associated ingress header from the outgoing encoder contents and
6 adds the ingress code check to the outgoing encoder contents.

1 17. The apparatus of claim 16 wherein the controller further comprises a mechanism
2 that modifies the ingress code check to compensate for non-data bits added to
3 the ingress data block.

1 18. The apparatus of claim 16 wherein the controller comprises a mechanism that
2 rotates the ingress code check to compensate for non-data bits added to the
3 ingress data block.

1 19. The apparatus of claim 16 wherein the controller adds the inverse of the portion
2 of the code check generated from the ingress header by the ingress encoder to
3 the outgoing encoder contents.

1 20. The apparatus of claim 15 further comprising a mechanism that modifies the
2 incoming information to compensate for non-data bits added to the ingress data
3 block.

1 21. The apparatus of claim 15 wherein the multiplexer comprises a mechanism that
2 concatenates the egress header with then associated egress data block and the
3 egress code check.

- 1 22. The apparatus of claim 15 wherein the ingress encoder comprises a one's-
2 complement encoder that generates a one's-complement sum of successive n -bit
3 binary words included in the ingress data block and the associated ingress
4 header.
- 1 23. The apparatus of claim 15 wherein the outgoing encoder comprises a one's-
2 complement encoder that generates a one's-complement sum of successive n -bit
3 binary words included in the egress header.
- 1 24. The apparatus of claim 15 wherein the ingress encoder comprises a vertical-
2 parity-check encoder that generates a term-by-term modulo-two sum of
3 successive n -bit binary words included in the ingress data block and the
4 associated ingress header.
- 1 25. The apparatus of claim 15 wherein the outgoing encoder comprises a vertical-
2 parity-check encoder that generates a term-by-term modulo-two sum of
3 successive n -bit binary words included in the egress header.
- 1 26. The apparatus of claim 15 wherein the ingress encoder comprises a cyclic-
2 residue-code encoder that generates the residue of the ingress data block and
3 the associated ingress header modulo a generator polynomial.
- 1 27. The apparatus of claim 15 wherein the outgoing encoder comprises a vertical-
2 parity-check encoder that generates the residue of the egress data block modulo
3 a generator polynomial.
- 1 28. The apparatus of claim 15 wherein the incoming information includes an
2 incoming code check associated with each ingress data block and the apparatus
3 further comprises a comparator for comparing the ingress code check to the
4 incoming code check and generating an error when the ingress code check does
5 not equal the incoming code check.

1 29. A computer program product for retaining error-control code protection across
2 block-size discontinuities occurring between incoming information, having
3 incoming data formatted into ingress data blocks and ingress headers, one
4 ingress header associated with each ingress data block and conveying
5 information about the each ingress data block, and outgoing information having
6 the incoming data reformatted into egress data blocks with sizes different from
7 the ingress data blocks and egress headers, one egress header associated with
8 each egress data block and conveying information about the each egress data
9 block, the computer program product comprising a computer usable medium
10 having computer readable program code thereon, including:

11 program code that generates an ingress code check from data in an
12 ingress data block and from an ingress header associated with the ingress data
13 block;

14 program code that generates a egress code check from the ingress code
15 check and an egress header associated with an egress data block derived from
16 in the ingress data block; and

17 program code that generates the outgoing information by combining the
18 egress header with the associated egress data block and the egress code check.

1 30. The computer program product of claim 29 wherein the program code that
2 generates a egress code check comprises:

3 program code that generates an egress code check from the egress
4 header;

5 program code that subtracts a portion of the ingress code check
6 generated from the associated ingress header from the egress code check; and
7 program code that adds the ingress code check to the egress code check.

- 1 31. The computer program product of claim 30 wherein the program code that
2 subtracts a portion of the ingress code check from the egress code check
3 comprises program code that adds the inverse of the portion of the ingress code
4 check to the egress code check generated.
- 1 32. The computer program product of claim 29 wherein the program code that
2 generates an ingress code check further comprises program code that modifies
3 the ingress code check to compensate for non-data bits added to the ingress
4 data block.
- 1 33. The computer program product of claim 32 wherein the program code that
2 modifies the ingress code check comprises program code that rotates the ingress
3 code check to compensate for non-data bits added to the ingress data block.
- 1 34. The computer program product of claim 29 wherein the program code that
2 computes the ingress code check further comprises program code that modifies
3 the incoming information to compensate for non-data bits added to the ingress
4 data block.
- 1 35. The computer program product of claim 29 wherein the program code that
2 generates the outgoing information comprises program code that concatenates
3 the egress header with the associated egress data block and the egress code
4 check.
- 1 36. The computer program product of claim 29 wherein the program code that
2 generates the ingress code check comprises program code that generates a
3 one's-complement sum of successive n -bit binary words included in the ingress
4 data block and the associated ingress header.

- 1 37. The computer program product of claim 29 wherein the program code that
2 generates the egress code check comprises program code that generates a
3 one's-complement sum of successive n -bit binary words included in the egress
4 header.
- 1 38. The computer program product of claim 29 wherein the program code that
2 generates the ingress code check comprises program code that generates a
3 term-by-term modulo-two sum of successive n -bit binary words included in the
4 ingress data block and the associated ingress header.
- 1 39. The computer program product of claim 29 wherein the program code that
2 generates the egress code check comprises program code that generates a
3 term-by-term modulo-two sum of successive n -bit binary words included in the
4 egress header.
- 1 40. The computer program product of claim 29 wherein the program code that
2 generates the ingress code check comprises program code that generates the
3 residue of the ingress data block and the associated ingress header modulo a
4 generator polynomial.
- 1 41. The computer program product of claim 29 wherein the program code that
2 generates the egress code check comprises program code that generates the
3 residue of the egress data block modulo a generator polynomial.
- 1 42. The computer program product of claim 29 wherein the incoming information
2 includes an incoming code check associated with each ingress data block and
3 wherein the program code that generates the ingress code check further
4 comprises program code that compares the ingress code check to the incoming
5 code check and generates an error when the ingress code check does not equal
6 the incoming code check.

- 1 43. A computer data signal embodied in a carrier wave for retaining error-control
2 code protection across block-size discontinuities occurring between incoming
3 information, having incoming data formatted into ingress data blocks and ingress
4 headers, one ingress header associated with each ingress data block and
5 conveying information about the each ingress data block, and outgoing
6 information having the incoming data reformatted into egress data blocks with
7 sizes different from the ingress data blocks and egress headers, one egress
8 header associated with each egress data bock and conveying information about
9 the each egress data block, the computer data signal comprising:
10 program code that generates an ingress code check from data in an
11 ingress data block and from an ingress header associated with the ingress data
12 block;
13 program code that generates a egress code check from the ingress code
14 check and an egress header associated with an egress data block derived from
15 in the ingress data block; and
16 program code that generates the outgoing information by combining the
17 egress header with the associated egress data block and the egress code check.